MAR-27-96 WED 11:49 P.01

40

Proj. File DD9588.1.2

RPF

58996

DANIEL B. STEPHENS & ASSOCIATES, INC.

ENVIRONMENTAL SCIENTISTS AND ENGINEERS

Post-it™ brand fax transmittal memo 7671 | # of pages ▸ 4
To John Williams | From Jeff Forbes
Co. ERM-Golder | Co.
Dept. | Phone #
Fax # 505-662-1398 | Fax #

4010.1

MEMORANDUM

To: Larry Coons

From: Jeff Forbes

Subject: TA-73 Landfill Soil Gas

Date: March 27, 1996

The possibility of landfill gas emissions at the abandoned TA-73 landfill has been raised several times during Tech Team meetings. Yesterday, John Hayes (ERM-Golder) and I attempted to determine if landfill gas is issuing from the northern perimeter of the abandoned TA-73 landfill, along the south wall of Pueblo Canyon. We used a Foxboro OVA FID meter to screen for VOCs, and a Landtec GA-90 multi-gas monitor to measure methane, carbon dioxide, and oxygen concentrations in soil gas and ambient air. The GA-90 also measures absolute barometric pressure, which is useful in determining when barometric exhalation of soil gas is occuring.

Our survey was conducted by walking over the area shown on the attached map (Figure 1) and checking the soil gas in animal burrows, fissures in soil or bedrock (volcanic tuff). In some cases, we inserted short sections of 1/4-inch stainless steel tubing to allow sampling of soil gas 1 to 2 inches below the surface. The survey was conducted between noon and 4:00 PM during a period of falling barometric pressure, when soil gas exhalation should be occurring. The GA-90 indicated that the barometric pressure fell from 777 mbar to 774 mbar during this period. The weather was very windy and cool, and the terrain along the canyon wall is very steep, making access difficult. Also, *note that we did not cover the area of refuse along the northeast boundary of the landfill.*

My observations from yesterday's survey may be summarized as follows:

- Landfill gas consisting of up to 25% methane and 31% carbon dioxide was detected atop the Main Landfill at the ground surface in the vicinity of LP-7 in fissures and burrows into the refuse;

- No methane or carbon dioxide were detected in burrows or fissures along the wall of Pueblo Canyon north of the boundary fence;

Based on these and previous observations, we may be confident in drawing the following conclusions:

- Based on subsurface temperature and gas composition measurements, the abandoned landfill is still generating significant amounts of landfill gas;

- The surface of the landfill periodically exhales landfill gas produced via biological decomposition of the organic refuse;

7170

DANIEL B. STEPHENS & ASSOCIATES, INC.

- Within the area underlain by refuse, the composition of the soil gas immediately beneath the surface (1 to 2 inch depth) is highly variable from place to place, with some areas showing nearly pure landfill gas (CH_4+CO_2), while others are similar to fresh air (N_2+O_2);

- The absence of oxygen in the shallow soil gas over portions of the landfill probably inhibits plant growth and root respiration;

- Shallow soil gas composition also varies with time of day due to barometric pumping. As a result of the semi-diurnal atmospheric tides, the highest landfill gas concentrations at the surface occur during periods of falling barometric pressure, generally during the afternoon (10:00 AM to 4:00 PM) and early morning hours (10:00 PM to 4:00 AM). Figure 2 (attached) shows an example of these temporal variations;

- Concentrations of VOCs and methane in soil gas are positively correlated, with the highest VOCs observed where methane concentrations are highest;

- Appreciable oxidation of methane, and probably VOCs, occurs in the uppermost portion of the soil where landfill gas mixes with oxygen from the atmosphere;

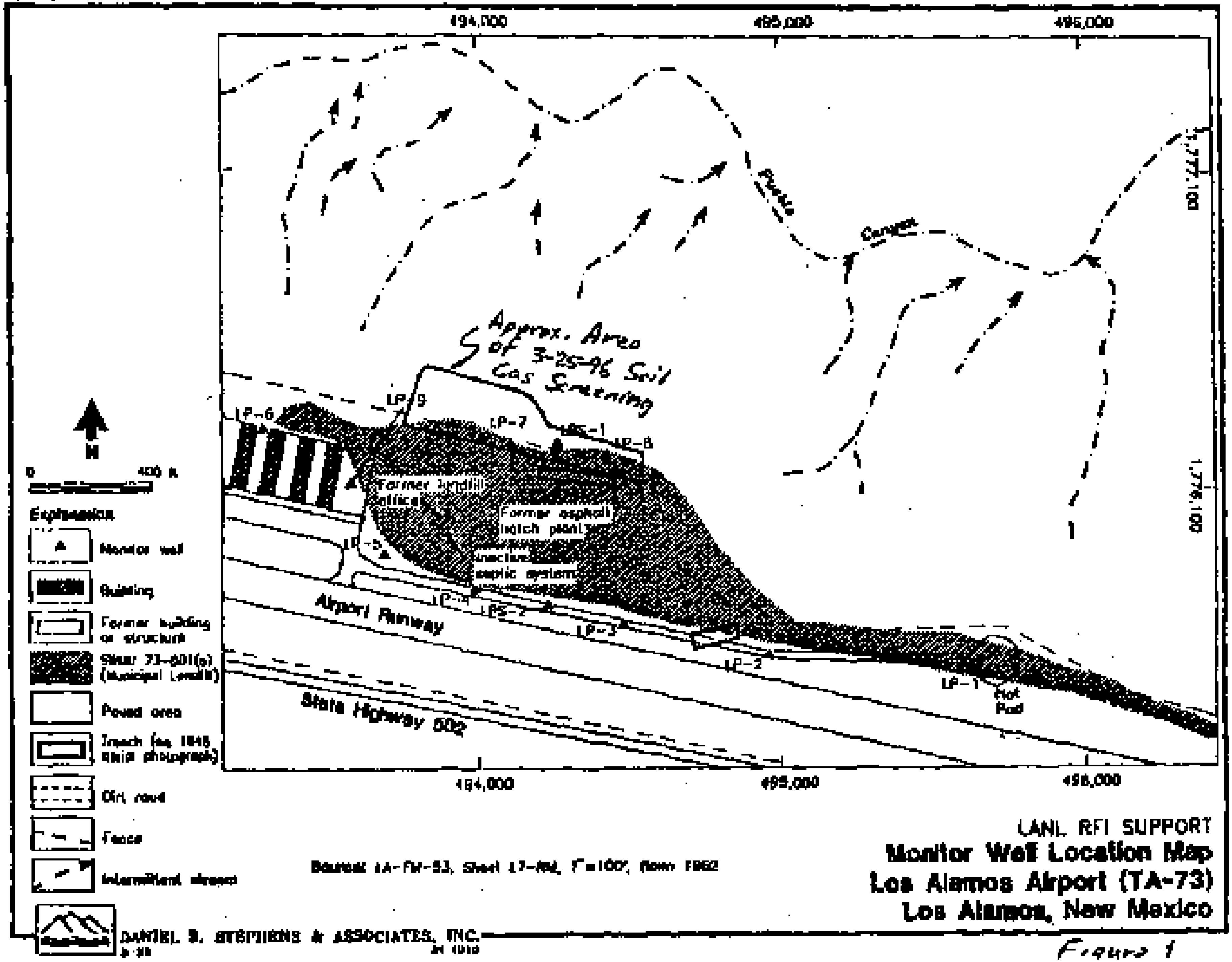
- Although considerable surface trash and debris is present along the canyon wall, no significant exhalation of landfill gas has been observed to the north of the landfill outside of the fenced area;

- The composition of deep soil gas in soil gas monitor wells LPS-1, LP-7, and LP-8 located near the edge of the mesa varies seasonally. CO_2 increases throughout the summer months, and declines in late autumn. The trend for O_2 is the opposite;

- The composition of deep soil gas at locations further inboard on the mesa is relatively constant over time.

In summary, our observations indicate that potentially significant emissions of landfill gas may periodically occur from the surface of the landfill itself. Such emissions should be taken into account when formulating plans for future land use and the need for corrective action. However, based on our limited screening survey, it does not appear that appreciable emissions occur from the canyon wall bordering the landfill on the north. While it is possible that some landfill gas may escape along the canyon wall, the quantities are likely much smaller than those emitted from the landfill surface, and the dilution upon mixing into the atmosphere would almost certainly reduce the concentrations of hazardous constituents below detection limits. Therefore, the risks posed by VOCs to potential receptors along the wall of Pueblo Canyon are likely negligible. At this time, we do not believe that further investigations are needed in the area along the wall of Pueblo Canyon. If additional confirmation is required for the Risk Assessment, however, a passive soil gas survey could be conducted in this area during the autumn, when any emissions would be at a maximum.

cc: Greg Brorby (GeoMatrix)
Carl Newton (LANL)
Rolf Schmidt-Petersen (DBS&A)
John Williams (ERM-Golder)



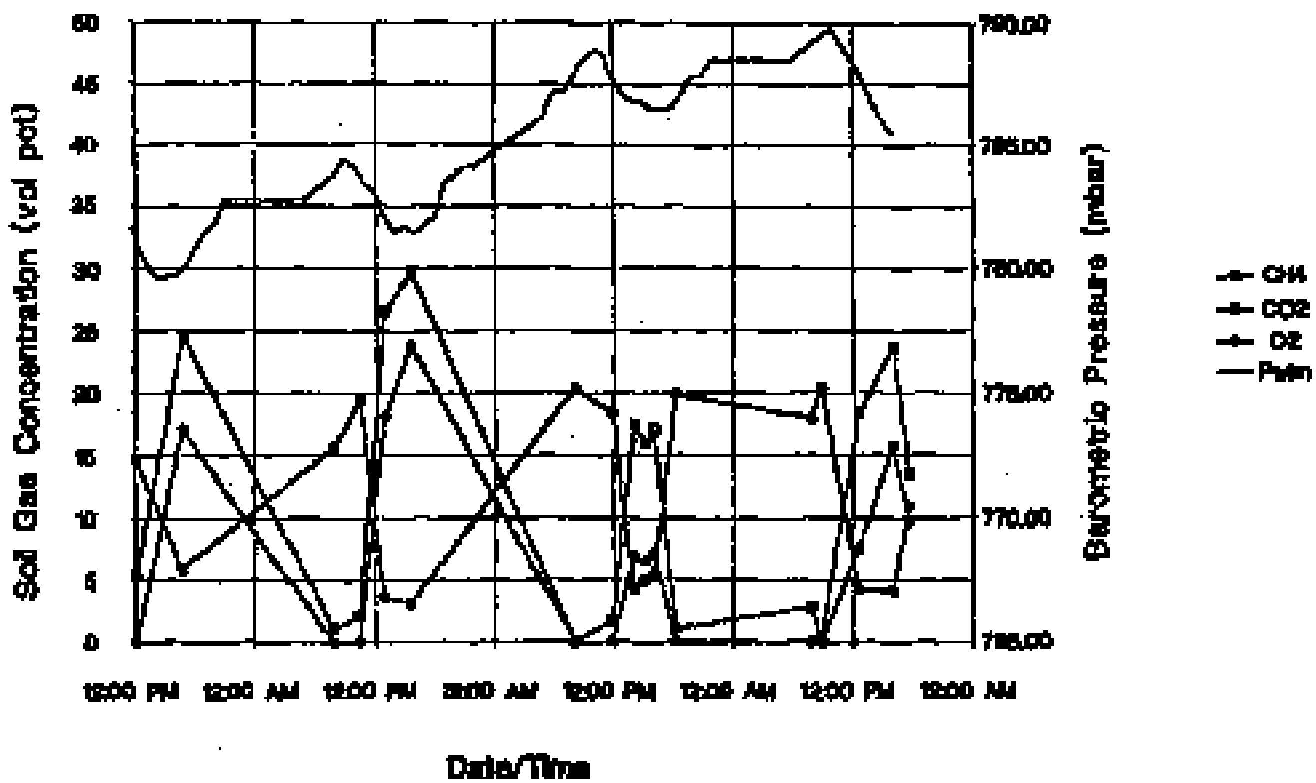
LANL RFI SUPPORT
Monitor Well Location Map
Los Alamos Airport (TA-73)
Los Alamos, New Mexico

Figure 1

DANIEL B. STEPHENS & ASSOCIATES, INC.
ENVIRONMENTAL SCIENTISTS AND ENGINEERS

Figure 2

Temporal Changes in Shallow Soil Gas Composition at TA-73 Landfill in Response Barometric Pumping (soil gas sampled Oct. 7-11, 1995 at 5-cm depth)



MEMORANDUM
ERM/GOLDER LOS ALAMOS PROJECT TEAM

To: Garry Allen
Carl Newton

From: John L. Williams

Date: 20 February 1996

Subject: FLUX CHAMBER TECHNICAL MEMORANDUM

I have attached a copy of the Technical Memorandum that Chuck Schmidt prepared on the results of the Air Pathway Analysis (APA) that was conducted at the airport landfill last fall.

Attachment: As Stated

cc: J. Bradley
Project File DD9588.1.4

C.E. SCHMIDT, Ph.D
Environmental Consultant

TECHNICAL MEMORANDUM

Results of the Air Pathway Analysis (APA)
Conducted at the TA-73 Airport Landfill
Los Alamos, New Mexico

REVISED DRAFT

Prepared For:

ERM/GOLDER LOS ALAMOS PROJECT TEAM
2237 Trinity Drive Building 2
Los Alamos, New Mexico 87544

Prepared By:

Dr. C.E. Schmidt
Environmental Consultant
19200 Live Oak Road
Red Bluff, California 96080

December, 1995

CE6A26/EN6R.TM

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Field measurements were conducted at the TA-73 Airport Landfill located in Los Alamos, New Mexico on September 18 through 22, 1995 in order to assess the air emissions of volatile organic compounds (VOCs) at the ground surface from subsurface solid waste. The objective of this testing effort was to conduct a limited EPA Air Pathway Analysis (APA), AIR/SUPERFUND NATIONAL TECHNICAL GUIDANCE STUDY SERIES, EPA 450/1-89-001 to determine soil gas emanation rates. The program included flux measurements made using the EPA recommended surface isolation flux chamber and sample collection with off-site analysis. Gas samples were collected in evacuated stainless steel canisters and analyzed by gas chromatography/mass spectrometry (GC/MS) using a high resolution instrument following EPA Method TO-14 for volatile organic compounds. Fixed gas analysis was also performed for carbon dioxide, methane, nitrogen, and oxygen.

Flux measurements were performed at 8 locations as "long-term" tests which included testing approx. 24-hours per day for four consecutive days. "Short-term" tests were also performed at 9 locations including co-location with long-term test locations. Replicate measurements (2) and system blank measurements (2) were also performed.

The purpose of this technical memorandum is to document the testing event and sample collection methodology used to perform the measurements, and to comment on the quality of these test data. Soil gas data are reported elsewhere.

I. INTRODUCTION

This brief, technical memorandum describes the field testing that was conducted in order to estimate the undisturbed surface emission rate of volatile organic compounds (VOCs) and fixed gases from the TA-73 airport landfill. Testing was conducted by Dr. C.E. Schmidt and representatives of ERM/Golder on September 18 through 22, 1995.

The TA-73 airport landfill is a former municipal landfill located at the Los Alamos airport. The landfill is closed and covered. The remarkable feature of this site is the location of the landfill. The landfill is located on a fractured rock mesa at the approx. elevation of 7,000 feet above sea level. As such, the characterization of the soil gas emissions from the landfill is potentially subject to greater influence from changing barometric pressure.

This memorandum includes a discussion of the testing methodology, quality control procedures, and results of the quality control procedures.

II. TEST METHODOLOGY

Testing was conducted using the EPA recommended Surface Isolation Flux Chamber (flux chamber) as the emission assessment tool to collect emissions data. The primary reference for this section is the document entitled "Measurement of Gaseous Emission Rates From Land Surfaces Using an Emission Isolation Flux Chamber, Users Guide" EPA Environmental Monitoring Systems Laboratory, Las Vegas, Nevada, EPA Contract No. 68-02-3889, Work Assignment No. 18, February 1986. Project work was conducted following the strategy and sampling/analytical protocols provided in the ERM/GOLDER Field Sampling Plan entitled, "SOIL GAS FLUX CHAMBER SAMPLING AT THE TA-73 AIRPORT LANDFILL," September 18, 1995.

Prior to testing, the flux chamber was cleaned by washing with soap (Alconox) and clean water, rinsing three times with clean water, and drying with clean paper towels. New teflon tubing was used for each chamber and all lines were purged with clean carrier gas prior to testing.

The operation of the flux chamber is given below:

1) Flux chamber, sweep air, sample collection equipment, and field documents were located on-site and at the test location.

2) The site information, location information, equipment information, date, and proposed time of testing were documented on the Emissions Measurement Field Data Sheet.

3) The exact test location was selected and the chamber was placed in the soil surface about 1/4". Thermocouples were used in order to monitor soil/air temperature inside and air temperature outside of the chamber. (Temperature data are used to show that the emission event was not disturbed during the measurement or to correlate emission rate to temperature).

4) The sweep air flow rate was initiated and the rotometer was set at 5.0 liters per minute. Constant sweep air flow rate was maintained throughout the measurement.

5) The chamber was operated at 5.0 liters per minute and temperature/organic vapor data were recorded during the purge time (five residence times or 30 minutes). Temperature and organic vapor data were taken during purging of the chamber at selected but not all test locations. The sample line was purged prior to sampling using a hand pump.

6) At steady-state (greater than 5 residence times or more), gas samples were collected in evacuated stainless steel canisters. Short-term grab samples, 6-hour integrated samples, and 24-hour integrated samples were collected. Short-term samples were collected at selected locations a rate of about 2

1/minute as grab samples and the test was discontinued. Long-term samples were collected at a rate of about 2.5 cc/minute for approx. 24-hours. Long-term tests were maintained for four consecutive days sampling continuously into four canisters over the four day time period. Low-flow flow controllers were used to control sampling to this rate. In addition, approx. four, 2~~8~~-hour integrated samples were collected at one location (SG-17) using a flow controller at at rate of about 33 cc/minute.

7) After sample collection, all samples were labeled and documented on the data sheet.

8) After labeling, all samples were properly stored as appropriate.

9) Sample collection was documented in the field master log book.

10) After sampling, the flux measurement was discontinued by shutting off the sweep air, removing the chamber, and securing the equipment.

11) Sampling locations were staked and labeled with sample location numbers.

The locations for testing were selected by representatives of ERM/GOLDER. Sample locations are described on the Flux Measurement Data Sheets (found elsewhere).

The study area locations were selected over areas where soil gas was thought to be emanating. Two system blank samples (short-term tests) and two replicate samples (short-term tests) were also collected. The system blank sample was performed as the field samples are collected following the EPA protocol, however, the chamber is placed on a clean, teflon surface. The source of compounds found in the blank samples can be the sweep air gas (<0.1 ppmv VOCs as methane), the teflon tubing, the canister, the laboratory instrument system, and the flux chamber. The levels of compounds found in the system blank sample can be used to qualify the field sample data.

Replicate sample collection and analysis was used to determine the overall system precision for flux and ambient air samples, which includes sampling and analytical variability. Replicate field samples were collected from the flux chamber at equilibrium conditions by collecting a second sample immediately after the field sample.

Because the measurement technique used for this site assessment has very low method detection limits, it is common to find compounds, including some of these target compounds, in all measurements.

III. QUALITY CONTROL

Quality control procedures that were used to assure quality data are listed and described below. The application and frequency of these procedures were developed to meet the program objectives and the data quality objectives.

- o Field Documentation -- A field notebook and data forms complete with sample chain-of-custody was maintained for the testing program. These data are available and are reported with the field sample results.

- o Laboratory Blank Analysis -- Data not provided.

- o System Blank Sample -- Two system blank samples were obtained by placing the clean chamber on a clean Teflon surface and operating the chamber as usual. The chamber was operated as described and system blank samples were collected and submitted for analysis. Blank testing was conducted at the beginning of the field test.

  A total of eight compounds were detected in one or both of the system blank samples, including: chloromethane (1.14 ppbv); trichlorofluoromethane (12.0 ppbv); methylene chloride (15.3/11.5 ppbv); toluene (0.77 ppbv); tetrachloroethene (0.56 ppbv); ethyl benzene (4.29 ppbv); m,p-xylene (1.58/22.8 ppbv); and o-xylene (4.63 ppbv). These are common system contaminants, however, the levels of trichlorofluoromethane, methylene chloride, and m,p-xylene are higher than typical system blank levels. Higher levels may be common for acrylic chambers. Methylene chloride appears to be a systematic contaminant. No baseline subtraction of the data is recommended, however subtraction of system blank levels is an acceptable data reduction approach.

- o Laboratory Duplicate Analysis -- Data not provided.

- o Replicate Sample -- Two replicate samples were performed by collecting a second canister during a flux measurement immediately after the sample canister at the same location. One pair (0173-95-0119/0173-95-0131) showed detection of 4 fixed gas compounds and 24 VOCs. The relative percent difference (RPD) for the fixed gases had a range of 0.93 to 12, an average RPD of 6.8, and no compounds exceeding the QC criteria of ±50%. The RPD for the VOCs had a range of 1.7 to 190, an average RPD of 28, and three compounds exceeding the QC criteria of ±50%. The other pair (0173-95-0120/0173-95-0132) showed detection of 2 fixed gas compounds and 12 VOCs.

The RPD for the fixed gases had a range of 0.25 to 0.87, an average RPD of 0.56, and no compounds exceeding the QC criteria of ±50%. The RPD for the VOCs had a range of 1.5 to 36, an average RPD of 10, and no compounds exceeding the QC criteria of ±50%. These data show typical sampling/analytical precision and are acceptable.

o <u>Method Spike Sample</u> -- No data available.

o <u>Chain-of-Custody</u> -- Sample labels and sample custody forms were completed and canister samples were executed as follows: canisters - heat and light avoidance, package for shipping, shipping by priority mail or hand delivery, analysis within 14 days.

IV. RESULTS AND DISCUSSIONS

Emission rate data are calculated by using measured target compound concentrations and flux chamber operating parameter data (sweep air flow rate 5.0 liters per minute, surface area 0.13 m^2). The emission rate of species, ERi (micrograms per minute per square meter), is calculated by knowing the sweep air flow rate, Q (cubic meter/ minute), species concentration Yi (micrograms/cubic meter), and exposed (to the chamber) surface area A (square meter) as follows:

$$ERi = \frac{Q \cdot Yi}{A} \qquad \text{EQUATION 1}$$

Reduced data for this testing effort are reported elsewhere. The following summary statements can be made regarding the testing effort and quality of these data.

- o The flux of VOCs and fixed gases were measured at the ground surface using the EPA-recommended surface isolation flux chamber technology. This technology quantitatively measures emission rates from the ground surface.
- o Laboratory blank, duplicate analysis and method spike quality control data are not available. No statement regarding the laboratory performance can be made.
- o Review of the field system blank and field data indicate that there may be system blank contamination, specifically methylene chloride, m,p-xylenes, and chloromethane. Without the laboratory blank data, it is not possible to identify the source(s) of contamination.
- o Field blank and duplicate sample quality control data indicate acceptable sampling method performance.
- o Eight compounds were detected in the system blank samples. The field data were not qualified with these data.
- o Flux data per area can be averaged and used to estimate the emission rate of measured VOCs above blank and background levels by multiplying average area flux by surface area per compound.

MEMORANDUM

ERM/GOLDER LOS ALAMOS PROJECT TEAM

To:	Garry Allen Carl Newton
From:	Charlie Wilson *for CW*
Date:	16 February 1996
Regarding:	REVIEW OF GEOPHYSICAL TECHNIQUES FOR LOCATING FUEL ROD

In his letter of 20 June 1995 to Mr. Corey Cruz of the U.S. Department of Energy, Mr. Louis Geoffrion, a former LANL employee, stated that in late 1960 a portion of a nuclear fuel rod had been mistakenly disposed of at the TA-73 Airport Landfill at Los Alamos. In his letter and in subsequent telephone conversations with me, Mr. Geoffrion stated that the rod consisted of a thin-walled tantalum tube containing a plutonium-iron alloy, with dimensions of approximately 5/8 inch diameter and 6 inches in length. With these dimensions, the rod would be approximately the size and shape of a thick pencil. He also stated in his letter that "With todays modern technology the Pu fuel rod should be easily located." When asked about the methods he was referring to for locating the rod, he stated that he had read of a technique recently developed by Sandia National Laboratories that he believed could be used to readily locate the rod. This document has been prepared to summarize the results of follow-up investigations regarding the current availability of methods at Sandia and elsewhere to find the rod.

David Borns of the Sandia Geophysics Department (telephone 844-0186) was contacted to obtain further information on recently developed methods that could be used to located the fuel rod. He believed that Mr. Geoffrion was probably referring to the High Resolution Magnetometer Towed Array that has recently been developed by scientists at New Mexico State University and was used in a demonstration project at Sandia's Mixed Waste Landfill in Technical Area 3. The buried landfill materials were detected by the array and the boundaries of the landfill were clearly delineated; however, Mr. Borns pointed out that while the rod at the Airport Landfill could potentially be detected at or near the ground surface if there were no other ferrous metal objects around, it would not be detectable if buried at a depth of tens of feet or if it was overlying or surrounded by other iron objects that would scatter the signal. Mr. Borne has visited the TA-73 Airport Landfill with me and is aware of the significant quantity of waste iron present and of the fact that the waste materials are as much as 80 feet thick.

A similar Towed Magnetometer Array was used in a demonstration project by the U.S. Navy at the TA-73 Airport Landfill at Los Alamos. The survey covered the entire main landfill area and revealed a complex pattern of disposed iron objects that were locally highly concentrated. Similar results were obtained from a second magnetometer survey of the site by Geophex Ltd.

The complexity of the signal indicated that this method could not be used to locate objects as small as the fuel rod.

To determine whether other techniques might be available to locate the fuel rod, George Schneider of the U.S. Department of Energy (208-526-6789) and Nick Josten of Lockheed Martin Idaho Technologies (208-526-7691) were contacted to discuss the Dig Face Characterization System being developed at Idaho National Engineering Laboratory. This system uses radiation sensors and imaging radar to scan the dig face during excavation of old landfills to identify the more highly radioactive hot spots before they are uncovered. This system, still under development, uses state-of-the-art detection techniques. Mr. Schneider believed that the imaging radar could potentially detect the fuel rod to a depth of about 18 inches, and the radiation detectors could possibly detect it to a depth of about 24 inches; however, none of the techniques could detect such a small object if buried at a depth of tens of feet, and particularly if the object were surrounded by a signal scattering environment of many other metallic waste objects. In addition to the scattering, a principal technical problem is that the longer wavelength signals that are needed for greater depth penetration also have lower size resolution capability. Mr. Josten generally agreed with Mr. Schneider, and indicated that if the rod were pure iron, it could potentially be detected at depths of 7 to 8 feet if it were in a noise-free environment with no other metal objects around. Because it is not pure iron and is not in a noise-free environment, it may not be seen at all. If radiometric methods were used, Mr. Josten indicated that the plutonium in the rod may be detectable at depths of 6 to 24 inches. Both agreed that the possibility of detecting an object as small as the fuel rod in the middle of a landfill surrounded by other metallic waste materials was essentially zero.

cc: J. Williams
File DD9588.1.4

MEMORANDUM
ERM/Golder Los Alamos Project Team

To: Alex Puglisi, ESH-18

From: Troy Eshleman

Date: May 17, 1996

Regarding: Discharge of Containerized Decontamination Fluids

This memorandum is to document the Tuesday, 7 May 1996 discharge of two 55 gallon drums at the TA-73, Airport Site, and one 55 gallon drum at the TA-10, Bayo Canyon Waste Storage Area - West. Liquid at both discharge sites was captured in a bermed area, all of the liquid evaporated within the berm. No liquids contacted the environment.

The discharge was conducted after receiving your verbal approval during a telecon discussion, and was based upon your review of the existing analytical results.

cc.
PF DD588.01
PF BG588.01
AL Funk
John Williams
Danny Katzman
John Kelly

MEMORANDUM

ERM/GOLDER Los Alamos Project Team

To: Dave Riker, Airport Manager
Bruce Hudspeth, Airport Operations Manager

From: Jayne A. Jones

Date: May 1, 1997

Regarding: **TA-73, FIELD UNIT 1, LOS ALAMOS AIRPORT, OPERATIONAL PLAN FOR PLANNED DRILLING ACTIVITIES AT SWMUs 73-001(a, d)**

Attached is an Operational Plan Addendum for the scheduled drilling activities at SWMUs 73-001(a, d). The tentative schedule for drilling is to start during the week of May 12, 1997. Drilling activities should be completed approximately 2 weeks after initiation of activities. Please review the Operational Plan Addendum and submit any comments to me by Thursday, May 8, 1997. Please feel free to contact me at 662-1335 if you have any questions.

cc: Carl Newton, EES-3
John Williams, ERM/Golder
Project File DD588

Project No. 19588
Task No. DD588
File No. 1.4
Date Filed 6/19/97

ERM/Golder
Project File Records

OPERATIONAL PLAN ADDENDUM
BOREHOLE DRILLING/COMPLETION

FIELD UNIT 1, TA-73
SWMU Aggregate 73-A

LOS ALAMOS AIRPORT

01 May 1997
Revision 0

OPERATIONAL PLAN ADDENDUM APPROVAL
BOREHOLE DRILLING/COMPLETION
FIELD UNIT 1, TA-73, SWMU Aggregate 73-A

Reviewed and Approved By:

Garry Allen CST-18 FPL	Signature	Date
John Williams ERM/Golder Field Team Manager	for John Williams Signature James Jones	5/1/97 Date
Dave Riker Los Alamos County Airport Manager	Signature	Date
Bruce Hudspeth Airport Operations Manager	Signature	Date

TABLE OF CONTENTS

OPERATIONAL PLAN ADDENDUM
BOREHOLE DRILLING/COMPLETION
Field Unit 1, TA-73, SWMU 73-001 (a, d)

1.0 INTRODUCTION

This Operational Plan identifies the methods and procedures to be implemented to address operational safety issues and concerns during the Phase I, Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) at Los Alamos Airport, Solid Waste Managment Unit (SWMU) 73-001(a, d) (see Figure 1).

2.0 WORK SCHEDULE

The work schedule in this operational plan presents the proposed start-up date, the type of work to be conducted, and the equipment to be mobilized to various locations at the airport for each task.

2.1 Drilling and Sampling

Borehole drilling and sampling activities are tentatively scheduled to begin the week of May 12, 1997, or as soon as the appropriate approvals can be obtained. Prior to any intrusive activities, the underground utilities will be located and marked on the surface. The drilling and sampling task requires one 3-person drill crew (Stewart Brothers Drilling Co.) and one 4-person sampling crew, including a Site Safety Officer (SSO) and a Radiological Survey Personnel (RSP) (ERM/Golder). The equipment required on-site specifically for borehole drilling operations consists of one truck-mounted drill rig, two support trucks, a 12-foot storage unit, a trailer-mounted steam-cleaning unit, and a fork-lift for moving drums. The drilling support equipment will be staged on-site in the designated staging area shown on Figure 2. In addition, approximately three personnel vehicles will be mobilized on and off of the site on a daily basis. The number of personnel vehicles brought on-site will be minimized. All personnel vehicles will be parked in the northeast corner of the asphalt tie-down pad, while maintaining access to the staging area. With the exception of drill-rig and support-truck operations during drilling activities, vehicles will not travel off the asphalt surfaces. Communications will be maintained with airport operations personnel during field activities utilizing 2-way, handheld radios provided by the airport.

All activities discussed in this plan will be conducted within the main landfill north of the runway and within the debris disposal area north of the east end of the runway (Figure 1). Five (5) boreholes are scheduled to be drilled within the main landfill and two (2) boreholes are scheduled to be drilled within the debris disposal area. These borings will range in depth from 60 to 110 feet below the ground surface.

The drill rig and support trucks will travel over the landfill area to the borehole locations. Approximately 1 hour will be required to set up the drill rig at each location. After mobilization is completed, drilling will begin. A 50-foot borehole should require approximately 6 to 8 hours to complete, in Levels C or D personal protection, provided that no adverse drilling conditions are encountered, such as refusal due to buried debris. After the borehole is completed, the drill rig, equipment and support vehicles will be moved out of the drilling area to the staging area. All waste produced from drilling will also be moved out of the drilling area at that time. All operations will take place north of the runway safety zone (see Figure 1). Communications will be maintained with airport operations personnel during field activities.

During the drilling operations, the augers and associated parts will be periodically cleaned in a designated area northeast of the airplane hangars (see Figure 2). Precautions will be taken during the cleaning process (as stated in the approved Waste Characterization Strategy (WCS) Form and Spill Prevention, Control, and Countermeasures Implementation Plan [SPCCIP]), to prevent the release of such liquids on the ground surface. Approximately 4 steel, 55-gallon drums containing equipment decontamination fluids, 21 drums of drill cuttings (soil, landfill material), and 4 drums of personal protective equipment and plastic sheeting, will be generated from the drilling and well installation operations (a total of approximately 29 drums). These drums will be secondarily contained and temporarily stored in the field northeast of the airplane hangars (Figure 2). The management of these investigation-derived materials will be directed by the approved Site-Specific WCS Form.

2.2 Well Installation

Well installation is scheduled to be conducted after completion of each borehole. This task requires the drill rig operator (Stewart Bros. Drilling Co.), a 2- to 3-person well installation crew (D. B. Stephens & Assoc.), and a SSO/RSP (ERM/Golder). The equipment required on-site for monitoring well-installation operations consists of one drill rig and one support vehicle, plus the equipment and personnel required for borehole drilling. In addition, approximately three personnel vehicles will be mobilized on and off the site on a daily basis. The number of personnel vehicles brought on-site will be minimized. All personnel vehicles will be parked in the northeast corner of the asphalt tie-down pad, while maintaining access to the staging area. With the exception of drill-rig and support-truck operations during well-installation activities, vehicles will not travel off the asphalt surfaces. Communications will be maintained with airport operations personnel during field activities utilizing 2-way, handheld radios provided by the airport.

Each borehole will be converted to a monitoring well equipped with one or more of the following instruments: single or multiple-gas-ports, suction lysimeters, neutron moisture meter access tubes, and heat dissipation sensors. All monitoring well surface completions will be flush-mounted vaults installed in a concrete pad. A determination will be made in the field as to the exact depth, types of instruments, and which boreholes will be selected for the installations. Several different types of monitoring instruments may be installed within the same borehole in some cases. The instrumentation installation activities will be conducted by D. B. Stephens & Associates. D. B. Stephens & Associates will determine the instrument locations, depths, and final design, and will coordinate the installation.

2.3 Monitoring Well Testing/Sampling

Monitoring-well testing is scheduled to be conducted following completion of borehole drilling and monitoring well-installation and will continue on a periodic basis for approximately two years. This task requires a team of approximately three sampling personnel (D. B. Stephens and Assoc.) and one SSO (ERM/Golder). The vehicles and equipment required on-site during the monitoring well testing operations consists of two support vehicles (standard pick-up trucks or mini-vans) containing the necessary equipment. Equipment and vehicles will be mobilized off-site after each well-testing event. Each event will require approximately two days.

3.0 METHODS AND PROCEDURES

The operational safety issues identified and the procedures to be implemented to address them are as follows.

3.1 Prevention of Ground Surface Disturbance

Efforts will be made to prevent disturbance of the ground surface in unpaved areas which may result in ruts, potholes, or mounds. To the extent possible, all equipment will be moved over paved surfaces (excluding the runway). All equipment and vehicles will be driven slowly and with extreme care when moving over unpaved areas, and vehicular traffic will be kept to a minimum. Any ruts or other surface disturbance resulting from vehicle traffic or drilling and sampling operations will be smoothed out to less than 3 inches of relief immediately following mobilization to and from each sampling site. In the event that significant soil is tracked onto paved areas, it will be removed immediately using square-bottomed shovels.

3.2 Removal of Soil from the Borehole Locations

All residual soils generated at the borehole locations and other areas on-site will be placed in 55-gallon steel drums. All drums will be moved to the approved on-site drum storage area as soon as work at each location is completed and the drilling equipment is demobilized from each borehole location. Drums will be placed on a truck at the completion of sampling activities at each borehole location, or more frequently if practical, and moved to a secure area. Residual materials will not be left within this zone at any time while the airport is in operation. If the drilling equipment is required to move off the borehole location at any time due to airport operations, all residual soils and materials will also be moved at that time.

3.3 Activity Within the Runway Safety Zone

The runway safety zone is the area within 100 feet of either side of the runway centerline. The Safety Zone boundary is marked by delineator posts that have red tape around the top. Drilling activities within the Runway Safety Zone are not planned at this time. In the event that drilling and sampling outside the safety zone creates operational safety concerns, controls will be implemented as directed by airport personnel.

3.4 Activity Outside the Safety Zone

Drilling activities outside the Safety Zone will be conducted in accordance with operational safety requirements. In the event that the presence of the drill rig and other equipment create operational safety concerns, additional controls will be implemented, as directed by Operational Safety Personnel. The mast on the drill rig will be lowered at the close of activities each day.

3.5 On-Site Equipment Traffic

All vehicle/equipment travel on-site will be routed over the taxiways and paved areas as much as possible. No equipment or vehicles will be moved on or across the runway at any time. The drill rig will be equipped with an amber-colored rotating beacon mounted on top of the mast. If significant soil is inadvertently tracked onto the taxiways or other paved areas from vehicle or equipment traffic, the soil will be removed immediately. A square-nosed shovel will be used to scrape the soils off the paved surface and, if necessary, any remaining soil will then be swept off the pavement with a push-broom. Measures will be taken to remove encrusted soils, if present, from the tires of all vehicles prior to driving onto taxiways or other paved areas.

3.6 Off-Site Equipment Fueling

All vehicles and equipment (with the exception of the drill rig) will be fueled off site. In the event that unscheduled fueling is necessary on site, the equipment will be fueled with a limited amount (5 gallons maximum) of fuel to enable mobilization off site for completion of fueling. The drill rig will be fueled on-site via auxiliary diesel fuel tanks in the bed of the drilling support pick-up truck. All fueling operations will be conducted in accordance with the SPCCIP dated January 1994. If a spill should occur, it will be cleaned up according to the SPCCIP and to the satisfaction of the Airport Manager.

4.0 SITE ACCESS

Prior to entering the "controlled" airport grounds, all personnel will be required to adhere to the following airport access requirements.

4.1 Sign-In/Out

All personnel will check in with the airport operations manager. Personnel will inform the operations manager as to the nature of their activities and sign in on the airport logbook. After completing their daily activities, all personnel will sign out on the airport logbook.

4.2 Muster Area

A Muster Area will be established on-site by the SSO based on daily wind directions, current work location, and airport operations. The Muster Area will be located so that airport operations are not impacted.

5.0 TRAINING

In addition to the training requirements identified in the Site-Specific Health and Safety Plan, site specific airport training may also be required prior to initiation of work activities. This training is administered by the airport operations manager and details the safety and operational protocol at the airport. This training is not required for periodic site visitors, however, a verbal briefing by airport dispatch personnel and an airport-trained escort are required before they will be authorized to drive a vehicle onto the site.

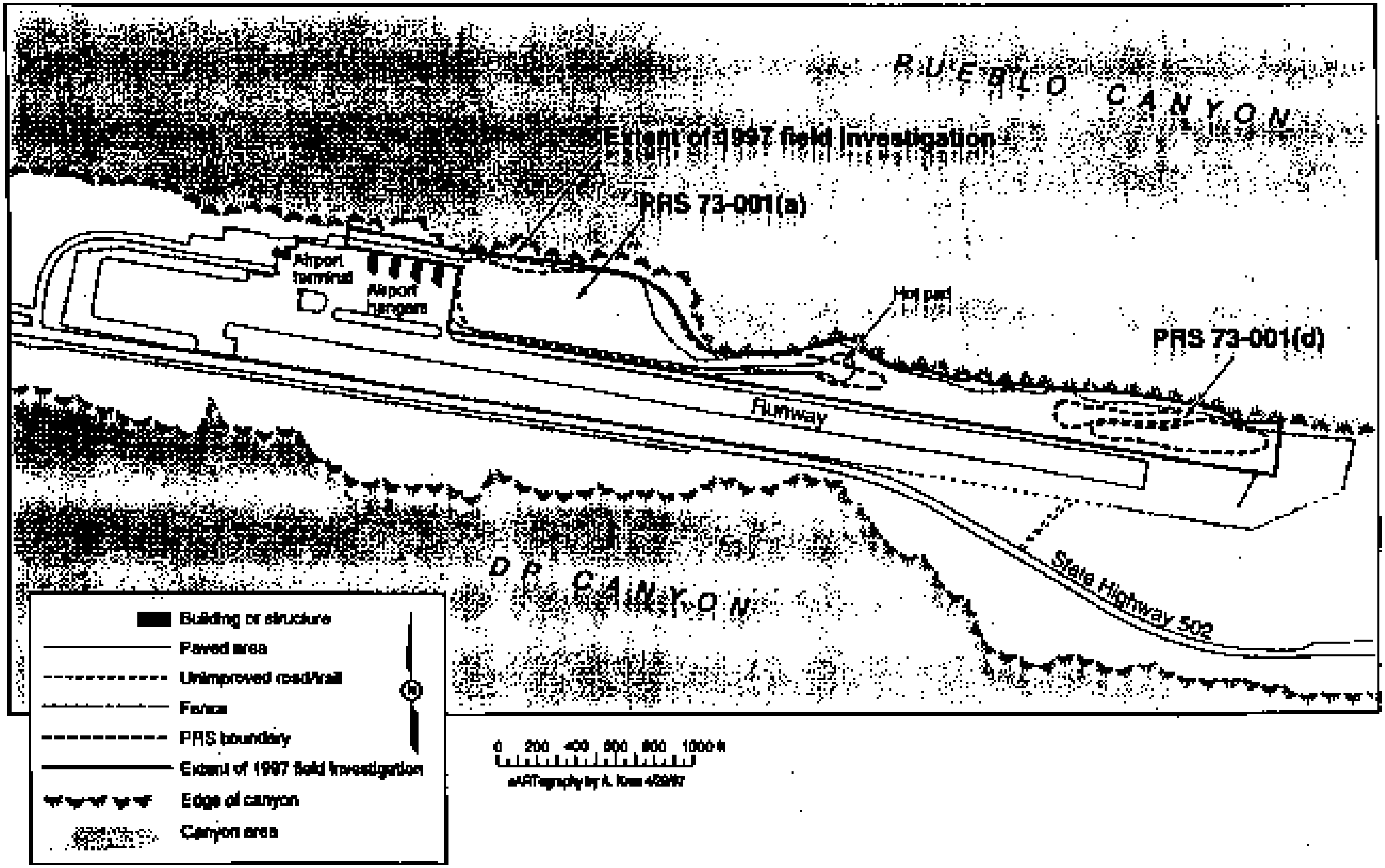


Figure 1. Aerial extent of 1997 field investigation for Field Unit 1 PRS Aggregate 73-A [PRSs 73-001(a,d)].

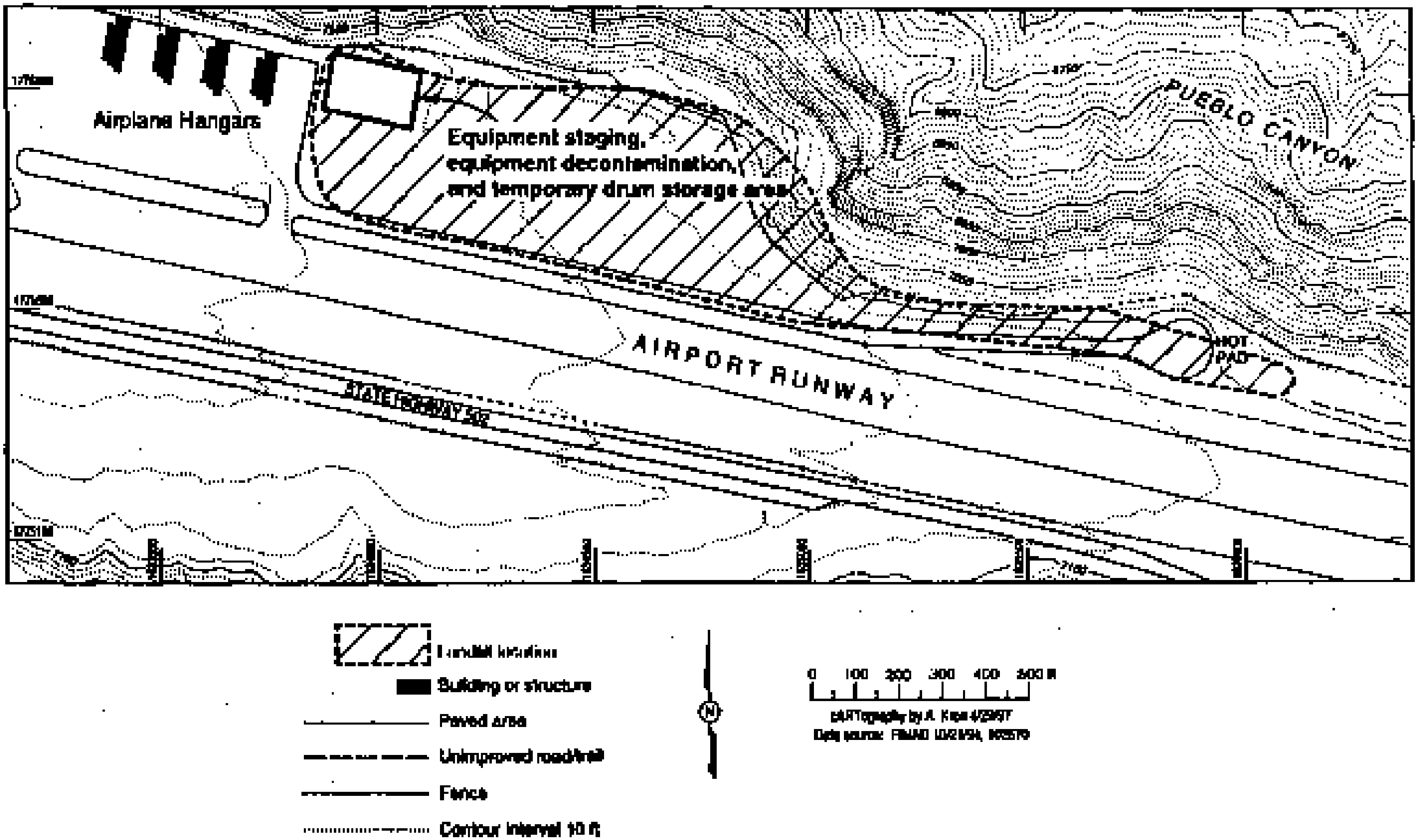


Figure 2. Equipment staging, equipment decontamination, and temporary drum storage area for the borehole drilling operations.

MEMORANDUM

ERM/GOLDER Los Alamos Project Team

To: Steve Bolivar, EES-13, (MS H665)

From: Jayne A. Jones, FTL

Date: May 12, 1997

Regarding: FIELD UNIT 1, TA-73, PRS 73-001(a,d), LOS ALAMOS AIRPORT, NOTIFICATION OF ANALYTICAL REQUIREMENTS

The tentative schedule for field work at the Los Alamos Airport is to mobilize to the site and begin drilling during the week of May 19, 1997. Approximately 7 boreholes will be drilled at PRSs 73-001(a,d). A minimum of two soil/tuff samples will be collected from each borehole and submitted to the SMO and the TA-21 radiochemical field screening laboratory. Each borehole will be completed as a monitoring well. The soil/tuff samples submitted to the TA-21 field screening laboratory will be screened for gross alpha, beta, and gamma, tritium, and percent moisture. Samples submitted to the SMO will require fixed laboratory analyses for volatile organic compounds by EPA SW-846 Method 8260, semivolatile organic compounds by EPA SW-846 Method 8270, pesticides/PCBs by EPA SW-846 Method 8080, TAL metals by EPA SW-846 Method 6010/7060/7471. One duplicate soil/tuff sample (QC sample) will be collected and submitted to a fixed-laboratory for the same analytical suite.

If enough liquid (leachate) is available in each of the monitoring wells then a leachate sample will also be collected. Approximately 5 liquid samples may be collected from PRS 73-001(a), main landfill. Samples submitted to the SMO will require fixed laboratory analyses for volatile organic compounds by EPA SW-846 Method 8260, semivolatile organic compounds by EPA SW-846 Method 8270, pesticides/PCBs by EPA SW-846 Method 8080, TAL metals by EPA SW-846 Method 6010/7060/7471, if enough liquid is available to sample. There probably will not be enough water in the boreholes at PRS 73-001(d) to collect any leachate samples.

After the boreholes are completed and instrumented, soil gas samples will be collected from each well. Some or all of the wells may have multiple gas ports. The number of gas ports per well will not be determined until the boreholes have been drilled. Approximately 7 to 14 samples will be collected several weeks to a month after installation activities are completed. In conjunction with the routine quarterly sampling activities. The QC samples to be collected will consist of one air blank and one performance evaluation sample. Each soil gas sample will be collected in a SUMMA® canister and submitted to a fixed laboratory for analysis by EPA Method TO-14.

A trip blank (QC sample) will be submitted for each shipment of soil or liquid samples to a fixed laboratory. The trip blank will be analyzed for volatile organic compounds by EPA SW-846 Method 8260.

Laboratory analyses and sample container requirements for soil, liquid, and soil gas samples are described in Table 1. All samples will be submitted for a 30-day turnaround time.

If you have any questions, please feel free to contact me at 662-1335.

cc: John Miglio (CST-9, MS H665)
Carl Newton (EES-3, MS E526)
John Williams (ERM/Golder, MS M327)
Project File DD588.1.4

Table 1. Sample Analyses and Containers

ANALYSIS	SOIL SAMPLES					
	PRESER-VATIVE	MATRIX	CONTAINER	NUMBER OF SAMPLES	NUMBER OF DUPLICATES/ TRIP BLANKS (QC)	NUMBER OF CONTAINERS
TA-21 Screening Lab. (gross alpha, beta, gamma, tritium)	NA	soil/tuff	plastic bag	14	0	14
TA-21 Screening Lab. (moisture content)	Ice, 4°C	soil/tuff	plastic bag	14	0	14
Volatile Organic Compounds (SW-846, Method 8260)	Ice, 4°C	soil/tuff	stainless steel liner*	14	1	15
Semi-Volatile Compounds (SW-846, Method 8270)	Ice, 4°C	soil/tuff	stainless steel liner*	14	1	15
Pesticides and PCBs (SW-846, Method 8080)	Ice, 4°C	soil/tuff	stainless steel liner*	14	1	15
TAL Metals (SW-846, Method 6010/ 7060/7471)	Ice, 4°C	soil/tuff	stainless steel liner*	14	1	15
Volatile Organic Compounds (SW-846, Method 8260)	HCL pH < 2 Ice, 4°C	leachate	2 - 40 ml amber glass vials with septa	5*	1	6
Semi-Volatile Compounds (SW-846, Method 8270)	No Reagent Ice, 4°C	leachate	1 L amber glass bottle	5*	1	6
TAL Metals (SW-846, Method 6010/ 7060/7471)	HNO_3 pH<2 Ice, 4°C	leachate	500 ml poly bottle	5*	1	6

ANALYSIS	SOIL SAMPLES					
	PRESER-VATIVE	MATRIX	CONTAINER	NUMBER OF SAMPLES	NUMBER OF DUPLICATES/ TRIP BLANKS (QC)	NUMBER OF CONTAINERS
Pesticides and PCBs (SW-846, Method 8080)	Ice, 4°C	water	1 L amber glass bottle	5[b]	1	6
EPA Method TO-14	none	soil gas	SUMMA® canister[c]	7 - 14	2[d]	9 - 16
Volatile Organic Compounds (SW-846, Method 8260)	HCL pH<2 Ice to 4° C	water (trip blank, QC sample)	1 - 40 ml amber glass vial with septa	one trip blank per shipment, supplied by lab	10[e]	10

[a] = will submit one stainless steel liner (3" diameter by 4" long) for all analytical suites for one sample

[b] = sample will only be collected if enough fluids are available

[c] = SUMMA® canisters are arranged through ESE Laboratories

[d] = one air blank sample and one performance evaluation sample

[e] = the number of trip blanks assumes that a shipment of samples will shipped out on a daily basis

MEMORANDUM

ERM/GOLDER LOS ALAMOS TEAM

To: Ann Rundle (ESH-5)

From: Kevin Hyde (ERM/Golder) KAH

Date: 6/27/97

Regarding: Airport Drilling Program at SWMU 73-001(a)

It is my understanding through our conversation today that there are two trigger levels for methane concentrations. One involves the measurement of methane LEL within the breathing zones of site workers. The action level in the breathing zone is 2% of the methane LEL. This concentration was set in regards to the impact of methane interference with the PID response. Such airborne concentrations require ventilation before proceeding.

The second methane action level is 20% of the methane LEL. This action level is set in compliance with the OSHA excavation regulation and is established with regard to the explosivity of methane. However, this action level will be employed around the cuttings box and around the augers. These locations need to be measured as they have the ability to concentrate methane gas and the metal surfaces present an opportunity for sparking. Concentrations of methane exceeding this limit will also require ventilation before proceeding.

If you are in agreement with these trigger levels, measurement locations, and response actions, please let me know.

cc: Carl Newton, FOM
John Williams, FTM
Rick Haaker, CIH
Jayne Jones, FTL
Project file: DD586.01

MEMORANDUM
ERM/GOLDER LOS ALAMOS PROJECT TEAM

To: Greg Bayhurst (Field Unit 1)

From: Kyle Gay KG

Date: 28 October 1997

Subject: Waste Characterization Sampling of Decon Water at TA-73

The sampling that was performed on 10 July 1997 to characterize the decontamination fluids generated at PRSs 73-001(a,d) (the LA Airport landfill and debris disposal area, respectively) deviated from the Waste Characterization Strategy Form (WCSF), Revision 1. The plan called for the collection of one grab sample from each liquid drum, instead only four of the ten liquid drums were actually sampled based on the following sampling strategy.

During the field investigation at PRSs 73-001(a,d), ten boreholes were drilled which generated a total of ten 55-gallon drums of decontamination fluids. These drums were grouped into four distinct waste groups as follows.

Waste Group #1 - One 55-gallon drum containing decontamination fluids used to clean sampling equipment at all ten boreholes.

Waste Group #2 - Two 55-gallon drums containing decontamination fluids generated while cleaning hollow-stem augers with a high-pressure steam cleaner. These augers were used at borehole LI-3 before they were cleaned.

Waste Group #3 - Six 55-gallon drums containing decontamination fluids generated while cleaning hollow-stem augers with a high-pressure steam cleaner. These augers were used at borehole LI-1 before they were cleaned.

Waste Group #4 - One 55-gallon drum containing decontamination fluids generated while cleaning hollow-stem augers with a high-pressure steam cleaner. These augers were used at borehole LI-6 before they were cleaned.

Waste groups 1 and 4 contain one drum each, and one grab sample was collected from each drum, as described in the WCSF.

The sampling strategy used for waste groups 2 and 3 deviated from the WCSF because only one grab sample was collected from each waste group rather than one sample from each drum. The hollow-stem augers from each waste group were cleaned using a high-pressure steam cleaner. After deconning the augers from each borehole, the fluids were collected in a reservoir on the steam cleaner before being pumped into multiple 55-gallon drums. The containerized fluids for each borehole were homogenous, and therefore a single grab sample was collected to characterize each waste group.

The WCSF estimates that less than four drums of liquid waste would be generated for the entire project, which implies that less than four characterization samples would be collected. Given the homogenous nature of each waste group, the cost-efficient approach was to collect one sample from each of the four waste streams. This strategy for characterizing the decontamination fluids also parallels the characterization strategy for the soil/refuse, in that these wastes were divided into common waste groups and one sample was collected from each group.

If you have any questions concerning the rational behind this sampling strategy, please feel free to call myself (662-1345) or John Williams (662-1332).

cc: John Williams (ERM/Golder)
Robert Rivera (EM/SWO)
Pat Shanley (ESH-19)
John Kelly (EM/SWO)
Project File DD9588.1.2

MEMORANDUM
ERM/GOLDER LOS ALAMOS PROJECT TEAM

To: Project File: DD588 3.2

Fr: Clint Daymon

Date: May 5, 1997

Re: Rationale For Health and Safety Action Levels, TA-73, PRS Aggregate 73-1

On May 3, 1997, Rick Haaker sent the attached memo to Ann Rundle of ESH-5 outlining our rationale for action levels to be implemented during the 1997 field work at TA-73, Los Alamos Airport main landfill and debris disposal area. These action levels have been incorporated into the site-specific health and safety plan for this project.

cc: Jayne Jones
John Williams

Sandia National Laboratories

Environmental Monitoring and Reporting Department, 7575, MS 0854

Facsi t

To: Clint D.
Company: ERM/Golder
Phone: 505-662-3700
Fax: -1398

From: Rick Haaker
Company: ERM PMC
Phone: 505-845-7718
Fax: -332-7976

Date: 5-5

Pages including this cover page: 4

Comments:

From:	[illegible]
Date:	5/3/97 12:51 PM
Subject:	rationale & proposed action levels
Address:	To: [illegible]

Hey Ann:
So what's the good word? What I wanted to discuss with you yesterday is provided below. It is the rationale and approach we are proposing to take. Acrolein is a potential headache for safety planning as you are well aware. Vinyl chloride isnt too much of a problem, and most everything else is trivial. I think that you will get the SSHASP on Monday or Tuesday. Please let me know what you think of the rationale. The attachment provides the same narrative given below in word 6.0 format.

Regards, RH.

Rationale and Discussion of Monitoring and Action Levels for Airport Landfill

Acrolein as a Contaminant of Concern

Acrolein has been reported in a total of 4 soil gas samples collected at the Airport Landfill out of more than 100 samples taken over the last 2 years: 2.34, 5.20, 13.1 and 54.6 ppb. At the same time MDAs for acrolein have ranged for 2 ppb to 50 ppb. No two of these results were obtained at the same location or gas port, and no trend is evident to me. Considering the range of MDAs for the acrolein data, I am flatly skeptical that any acrolein was actually present in excess of detection criteria in the first three samples. The fourth acrolein soil gas sample was reported at 54.6 ppb, approximately the established exposure limit (OEL). This value is only twice the maximum MDA reported for acrolein in our data set; accordingly, the laboratory data package for this sample would need to be examined critically before concluding that acrolein was actually present.

Acrolein reminds me of another contaminant of concern that I have considerable experience with, radon. Both radon and acrolein are volatile but they have a considerable solubility in water (soil moisture). Radon-222 concentrations are present in typical soil gases at concentrations in excess of the occupational exposure limits (OEL). When drilling on uranium mill tailings piles, radon-222 is present in soil gases at concentrations that exceed OELs by a considerable margin. Despite this, radon-222 is not a respiratory hazard when drilling in soils or on uranium mill tailing piles. Likewise, the available data indicates to me that acrolein is not a practical respiratory hazard at the airport landfill. Even if it were present in the range of a few ppm in soil gas, it still is not a problem in my opinion.

We can monitor for acrolein as a part of the drilling activities. However, there are practical difficulties with doing so. There is not a detector tube that is specific to acrolein, or even a detector tube that is specific to aldehydes that I am aware of. Substance specific detectors like a MIRAN or B&K gas analyzer can detect acrolein. In the case of the MIRAN, it can readily detect concentrations that are below IDLH (2 ppm), but not at the STEL concentration of 0.3 ppm. Somewhat better performance may be obtained from the B&K gas monitor.

Prior to shoveling cuttings, it is practical to turn off the ventilation to the cuttings box, wait a couple of minutes, and if PID readings exceed 5 ppm in the box, monitor with a MIRAN. (A 5 ppm gross PID reading is a conservative action limit, as acrolein is unlikely to be present except at high dilution with other organics) Doing so will allow us to ensure that acrolein concentrations within the confined space of the box do not exceed IDLH levels before opening it.

Similarly, we can have the drillers step back and allow the augers to vent for a couple of minutes each time they add or break auger. The SSO can monitor near the auger to with a PID to ensure that gross organic vapor concentrations do not exceed 5 ppm at the source. If they do, then followup MIRAN readings can be taken to ensure that acrolein concentrations do not exceed IDLH levels at the emission point before the drillers resume work.

Except when shoveling the cuttings or adding/breaking auger, the airborne concentrations have to be effectively zero because of natural ventilation, our engineering controls and lack of significant down-hole concentrations. Thus I see no need to have an instrument on-site that can detect acrolein at the TWA (0.1 ppm). If concentrations of acrolein dont exceed IDLH levels at the source (cuttings box or top of auger), then I dont see how we have the potential to exceed STEL limits (0.3 ppm) in the breathing zone when shoveling the cuttings or adding/breaking auger. Consequently I see no need to have an instrument on-site that can detect acrolein at the TWA (0.3 ppm). I believe that either the B&K gas analyzer or the MIRAN are sufficiently sensitive to protect workers from acrolein exposure given our proposed engineering controls and procedures.

Vinyl Chloride

Vinyl chloride is undoubtedly a landfill gas constituent that presents its own monitoring difficulties. Vinyl chloride detector tubes also respond to olefins as well as other chlorinated solvents so they are of little use. Substance specific detectors like a MIRAN or B&K gas analyzer can detect vinyl chloride. In the case of the MIRAN, it can readily detect concentrations that are at or below the STEL (5 ppm), but not the TWA concentration of 1.0 ppm. Somewhat better performance may be obtained from the B&K gas monitor.

Prior to shoveling cuttings, it is practical to turn off the ventilation to the cuttings box, wait a couple of minutes, and if PID readings exceed 10 ppm, monitor with a MIRAN, if PID readings exceed 10 ppm. (A 10 ppm gross PID reading is a conservative action limit, as vinyl chloride is unlikely to be present except at high dilution with other organics). Doing so will allow us to ensure that vinyl chloride concentrations within the confined space of the box do not exceed STEL (5 ppm) levels before opening it.

Similarly, we can have the drillers step back and allow the augers to vent for a couple of minutes each time they add or break auger. The SSO can monitor near the top of the auger with a PID to ensure that gross organic vapor concentrations do not 10 ppm at the source. If they do, then followup MIRAN readings can be taken to ensure that vinyl chloride concentrations do not exceed the STEL level at the emission point before the drillers resume work.

Except when shoveling the cuttings or adding/breaking auger, the airborne concentrations of vinyl chloride lack the potential to approach the TWA (1.0 ppm) in the breathing zone because of natural ventilation, and our engineering controls. Thus I see no need to have an instrument on-site that can detect vinyl chloride at the TWA (1.0 ppm). I believe that either the B&K gas analyzer or the MIRAN are sufficiently sensitive to protect workers from vinyl chloride exposure given our proposed engineering controls and procedures.

Benzene

The benzene standards do not apply to this work because any soil moisture that we expect to encounter lacks the potential to contain benzene at concentrations exceeding 1000 ppm. Consequently only the PEL applies. Since we are proposing to perform all intrusive activities in level C (GMC-H) cartridges, sufficient protection against benzene is provided by our proposed 20 ppm breathing zone PID reading action level.

A 20 ppm PID reading in the breathing zone is our proposed action level for stopping work, reevaluating engineering controls, allowing the borehole to vent, or as a last resort upgrading to level B.

Other Organics

Since we are proposing to perform all intrusive activities in level C (GMC-H) cartridges, sufficient protection against other organics is provided by our proposed PID reading action level. A 20 ppm PID reading in the breathing zone is our proposed action level for stopping work, reevaluating engineering controls, allowing the borehole to vent, and as a last resort upgrading to level B.

--

Rick Haaker
home phone/fax 505-332-7976, aqsafety@swcp.com
SNL phone 505-845-7718, rfhaake@envc.sandia.gov
:X:X:X:X:X:X:X
"I haven't lost my mind; I have a backup copy somewhere."

ERM/Golder Los Alamos Project Team
PERSONNEL TRAINING RECORD

Training Session Date: 6/17/97 Trainer: Bruce Hudspeth (airport operations mgr)

Reference Requirements, Procedures, Plans, or Instruction:

Site specific Airport Awareness Training

Attendees:

Name (print)	Signature	Name (print)	Signature
Kevin Hale	[signature]	Tim Kelsey	[signature]
Luther P. Garcia	[signature]	Jeffrey Forbes	[signature]
Shayne Jones	[signature]	Todd L. S[illegible]	[signature]
Chet Dugan	[signature]		
Stanley Shannon	[signature]		
Kyle Carey	[signature]		
Charlotte Stevens	[signature]		
Lawrence Cook	[signature]		

Summary:

Project No. 19588
Task No. DD588
File No. 1.7
Date Filed 6/19/97c
ERM/Golder
Project File Records

Reviewed by Quality Assurance: [signature] 6/18/97
Date

cc: Project File Number: DD588
Work Release Manager